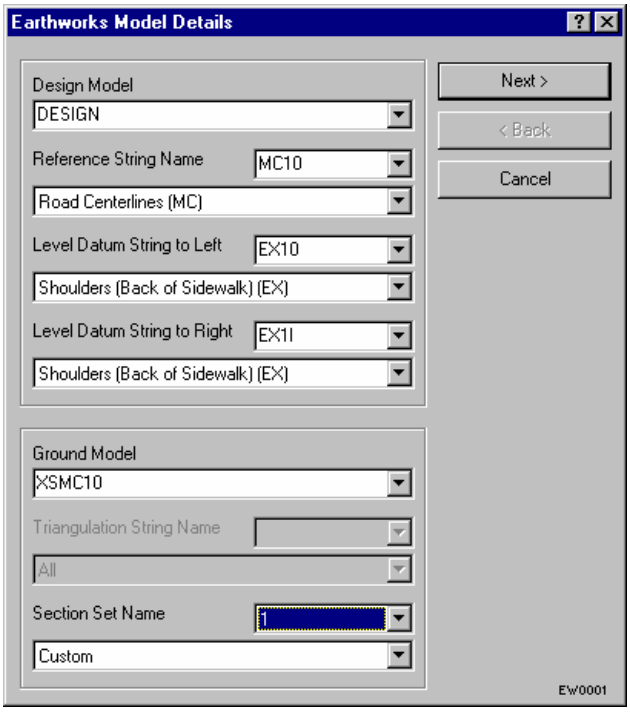
Chapter 13 Interfacing Proposed Design To Existing Ground

Once cross sections of existing ground and proposed design are created, we can now do our slope and ditch work. This can be accomplished by utilizing the MXRoad Earthworks Wizard, or by building a custom INPUT file.

CAUTION! *The Earthworks process is dependant upon having the most information available in the XSMC10 model. Every time new sections are cut, the strings labeled G,T, and S, are deleted and re-cut so the most current information is available. This means that if the last time sections were cut, you had specified minimal section information that would be the only information available for Mx to base the earthworks on. You* ***must*** *make sure that the cross section information is as complete as possible so that you will generate accurate earthworks data.*

Interfacing with the MXRoad Earthworks Wizard:

Step 1: Select ***Design, Earthworks Wizard*** from the menu bar. The following panel will appear:

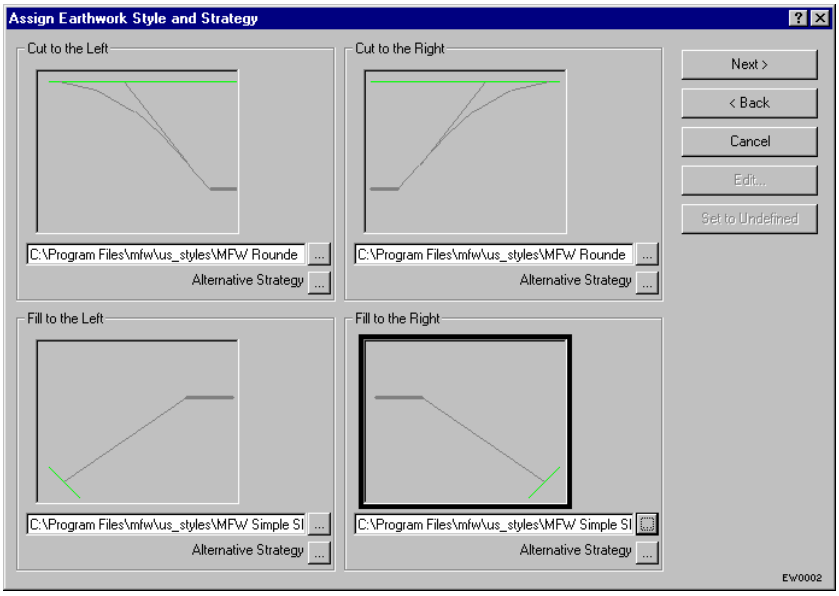


Select the Design Model and Reference String.

Select the *level datum string* on the left and right. This is the string that the interface will be constructed from.

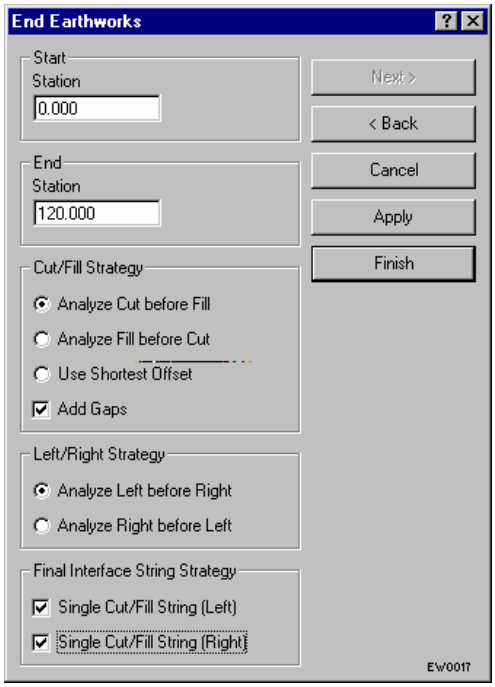
Also select the section model, and the section set name for the existing ground section.

Step 2: The following panel will appear:



This is where you determine your earthworks solution for the cut and fill conditions on each side of the road. Below each picture, is a text box showing the location of the earthworks style file being used. To change this, click the little button next to the box. Other earthworks styles will be displayed. Select the one you want, and then click ***Next***.

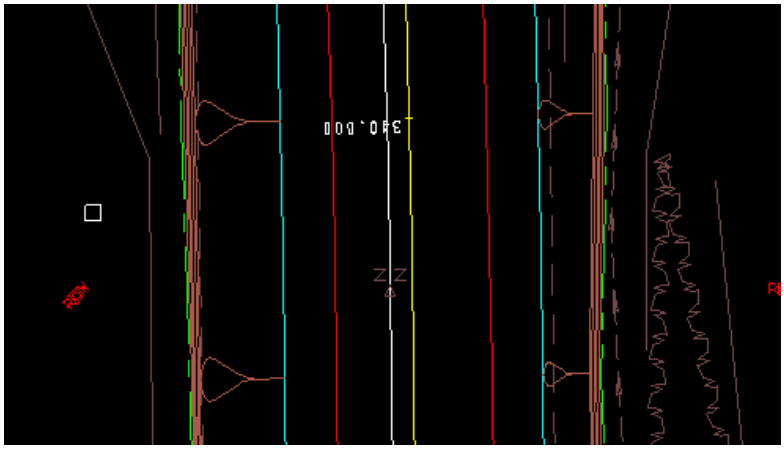
Step 3: The following menu will appear:



This is where you designate the station limits to apply this strategy. In the example to the right, we're applying it from station 0 to station 120.

Since we want to then apply a different solution from station 120 to the end of the project (because the level datum string will be different), click on the Apply button. The interfacing will be done for this section of roadway.

Step 4: Click the Back button as necessary to return to the Earthworks Wizard's first panel. Respecify the level datum string labels, then continue through the wizard as before, setting the station limits from station 120 to the end of the job on the last panel. Your interface lines will be drawn on the display as they're created:



Interfacing Using the INPUT File Method

The wizard above does a pretty good job automating the interfacing process, but sometime you might need to create your own files to have greater control over this process. One of the unfortunate things about the wizard is that changes are not all that easy to make once the strings are generated. This section will provide some detailed explanation about MX's Major Option INTERFACE, and how to write INPUT files invoking it.

Major Option INTERFACE

Major Option INTERFAC (Note that the MX command doesn't have an "E" at the end), is set up in an INPUT file or LINEMODE MX by the following line:

```
INTERFAC,XSMC10,DESIGN
```

This line says that we're going to INTERFAC our DESIGN Model to stored cross sections which are kept in model XSMC10. Interfacing to previously stored cross sections allows us to control exactly how many points are created on our interface strings, since we can control exactly which sections are created. We could also interface to the GROUND model, but MOSS would generate its own sections based on every point on the Master Alignment (MC10), which might not be the designer's preference. It is recommended that you use stored sections with INTERFAC.

An INTERFAC section in an INPUT file consists of the line above, followed by a combination of the following Minor Options:

Minor Option 260	***Define Strings***
Minor Option 261/262	***Interface Details***
Minor Option 263	***Invoke Interface Analysis***
Minor Option 264	***Invoke Slope Rounding***

Before the details of these minor options are explained in detail, an explanation of the string naming convention is in order. The number of interface strings you will generate will depend on your design, but they will either be defined as CUT strings or FILL strings. Interface string labels for CUT will begin with the first two characters "IC" while interface string labels for FILL will begin with the first two characters "IF". The third character will designate the mainline alternate or side road letter, and the last character will follow standard naming convention for left and right sides. Some examples:

Master Alignment	Cut Label (lt.)	Fill Label(rt.)
MC10	IC10	IF1I
MC20	IC20	IF2I
MCA1	ICA0	IFAI

*NOTE: It's not required that you designate a different string label each for cut and fill conditions. You can simply create a single interface string with label "IA" that will represent both, but it will require the CADD detailer to perform more work when producing final plans. By using separate cut and fill strings, we can automate the assignment of linestyles when transferring data.

Minor Option 260, Define Strings

Minor Option 260 is used to define the master alignment the interface strings are associated, the cut and fill interface string labels, on which side of the master alignment the interface is to be generated, and the station to station limits for the interface criteria to be applied, if desired. A typical 260 command line is as follows:

```
260,MC10,IC10,IF10,-1
```

This line tells us that we will create interface strings IC10 and IF10 to the left side of Master Alignment MC10. The field definitions for this option are as follows:

*	Field 1	Reference String on which the interface is based.
	Field 2	The label of the interface string for CUT
	Field 3	The label of the interface string for FILL
	Field 4	Style of Interface. (See the Quick Reference Guide for more information. Typically this field is simply set to "-1" to indicate the interface is to the left side of the Master Alignment String, or "+1" to indicate that the interface is to the right side of the Master Alignment String.)
	Field 5 & 6	SPRD for start point on reference string
	Field 7	Limit on the number of profile points generated on any one section
	Field 8 & 9	SPRD for end point on reference string
	Field 10	A value of 1 invokes rounded/standard interfaces

Minor Option 261 / 262, Interface Details

The 261/262 minor options are where the real work of interfacing occurs. They are used to define the conditions and criteria for interfacing, and whether CUT conditions or FILL conditions are evaluated first. Field Definitions for Minor Option 261 and 262 are identical. They are, in fact, the same command, but one of them is used to define the cut conditions, and the other the fill conditions. Normally we use 261 to define the CUT conditions, and 262 to define the FILL conditions. In the event that you want to use a single interface

string to represent both CUT and FILL conditions, only a single command number is necessary or allowed.

The field definitions for ***Minor Option 261/262 , Interface Details*** are as follows:

Field 1	Stored Section Set Reference Character, IGN, or AUTO
Field 2	Label of the level datum string
Field 3	The string to which the element of the profile defined on this minor option is to be extended.
Field 4	The number of dimensions of the string created at the profile definition point.
Field 5	Element Width
Field 6	Surface Adjustment Height
Field 7	Gradient at the start of the range of application of the interface as defined by SPRD in the immediately preceding 260 record
Field 8	The number of elements (n) in the pattern which is defined on this and the next (n-1) 261/262 records
Field 9	If LEVL is specified in field 1 then field 9 contains the level at which the interface is to be found.
Field 10	Gradient at the end of the range of application of the interface as defined by SPRD in the immediately preceding record This is specified as vertical component divided by horizontal component - not as percentage.

Creating a Standard V-Ditch Using Interface

The following lines of code will create a V-ditch (ID1I) on the right side of mainline MC10, and a CUT Interface string (IC1I) on a 1:2 backslope:

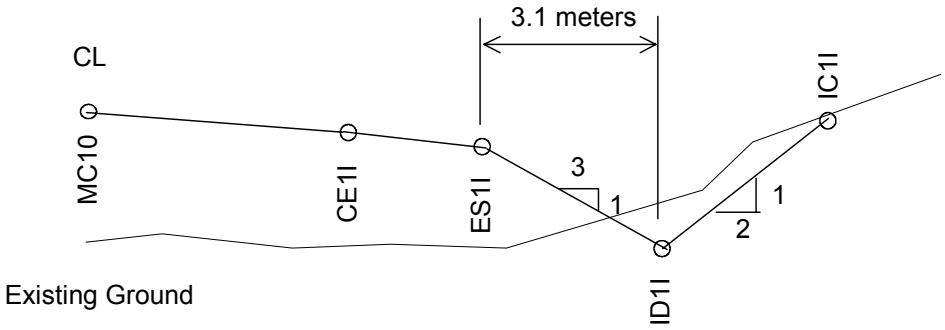
```
260,MC10,IC1I,,+1
261,IGN,ES1I,ID1I,5=10,7=-0.333
261,G,ID1I,,7=+0.500
263
```

The 260 line above sets up the creation of IC1I to the right (+1) of the master alignment MC10. As you can see, by not specifying an Interface String for FILL conditions, all points created will be put into string IC1I.

The next line:

```
261,IGN,ES1I,ID1I,5=10,7=-0.333
```

creates a string (ID1I) to represent the bottom of the V-Ditch a constant 10 feet to the right of Subsidiary String ES11, at a 1:3 downslope. By inserting "IGN" in the first field, the MX engine will "Ignore" a possible interface that may occur within the offset and slope criteria listed in fields 5 & 7. The creation of string ID1I is illustrated in the following cross-section:



As you can see in the illustration, we "ignored" the fact that we passed through the existing ground section on our way to the location of string ID1I by using the "IGN" feature.

The next line of code is:

```
261,G,ID1I,,7=+0.500
```

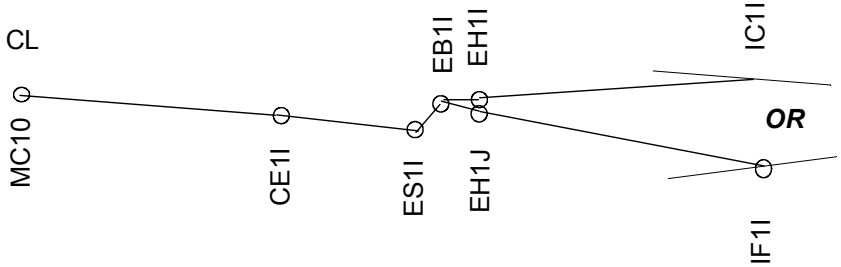
The "G" in the first field tells the MX engine to use the stored section set in XSMC10, which begins with the letter "G" to represent the existing ground in interfacing computations. Field 2 tells us that this command will start from the ditch string ID1I we just created the line before, and all offsets and/or gradients will be based from that point. By leaving field 3 blank, this tells MX that this if an interface is found along the specified gradient within the offset specified, then this point of interfacing should be added to the CUT Interface string specified in the previous 260 command. Since we don't specify an offset in this line in field 5, we're telling MX to reach as far as necessary along the specified gradient "+0.500" to find an interface. If there is no solution by the time the end of the "G" string is reached, then no point will be created.
The next line of code is:

```
263
```

This invokes the Interfacing Analysis. No additional data is required.

Create A Standard Berm Behind Curb Using An INPUT File

In urban jobs, and some places in rural areas, a ditch is not needed or desired. Many times we simply want to create simple cut/fill lines behind our proposed curbing. This example illustrates a file that creates both a CUT Interface string and a FILL Interface string if conditions warrant it.



In the following example code, we will attempt the CUT Interface condition first. To do this, we will create a CUT berm string ,EH1I,, and attempt to find a CUT Interface from this string to create a point for IC1I. If there is no solution under CUT conditions, then the FILL berm string, EH1J, will be created, and MOSS will progress through the specified criteria to create a point for FILL Interface string IF1I.

```
INTERFAC,XSMC10,DESIGN
260,MC10,IC1I,IF1I,+1,10007.600,8=10100.000
261,IGN,EB1I,EH1I,5=0.2,7=+.06
261,G,EH1I,5=2,7=+.06
261, ,EH1I,5=2,7=+.08
261, ,EH1I,5=2,7=+.10
261, ,EH1I,5=2,7=+.12
261, ,EH1I,5=2,7=+.14
261, ,EH1I,5=2,7=+.16
261, ,EH1I,5=2,7=+.18
261, ,EH1I,5=2,7=+.20
261, ,EH1I,5=2,7=+.22
261, ,EH1I,7=+.33
262,IGN,EB1I,EH1J,5=0.2,7=-.06
262,G,EH1J,5=2,7=-.06
262, ,EH1J,5=2,7=-.08
262, ,EH1J,5=2,7=-.10
262, ,EH1J,5=2,7=-.12
262, ,EH1J,5=2,7=-.14
262, ,EH1J,5=2,7=-.16
262, ,EH1J,5=2,7=-.18
262, ,EH1J,5=2,7=-.20
262, ,EH1J,5=2,7=-.22
262, ,EH1J,7=-.33
263
999
```

This file will create IC1I and IF1I to the right of MC10 , beginning at STA 10+007.600 and ending at STA 10+100.000.

```
260,MC10,IC1I,IF1I,+1,10007.600,8=10100.000
```

It then proceeds to the 261 options, which are the CUT Interface criteria. It creates a berm string EH1I from the back of curb string EB1I if there is a solution to the CUT Interface criteria. It then will move sequentially down the 261 options searching for an interface from this string EH1I according to the offset and slope criteria specified in fields 5 & 7. Note that the final 261 command doesn't specify an offset, but rather tries to interface upwards at 1:3 to infinity. If a solution isn't found using this last 261 option, it proceeds to the FILL Interface critera which are represented by the 262 options.

If the CUT Interface Criteria aren't met, then it must be a FILL Condition. This file then creates a Fill Berm string EH1J from the back of curb string EB1I and progresses through the FILL Interface criteria until a solution is found. The 263 command invokes the Interface Analysis and creates the interface strings.

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